

Carquinez
Strait Bridge

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Introduction

CARQUINEZ Strait, over which the Carquinez Bridge is now being constructed, is a wide and deep tide-water channel that separates, as by a wall, the rich valleys of Central and Northern California from their natural port and metropolis on San Francisco Bay and from the Great Coast Highways to the Southlands. This obstacle to traffic and development has been recognized since the development of the State first began three-quarters of a century ago. Not until now has any effort been made to master it.

Governor Richardson, on May 7, 1923, signed the Validating Act that authorized commencement upon the work of constructing the Carquinez Bridge according to plans previously approved by the United States authorities.

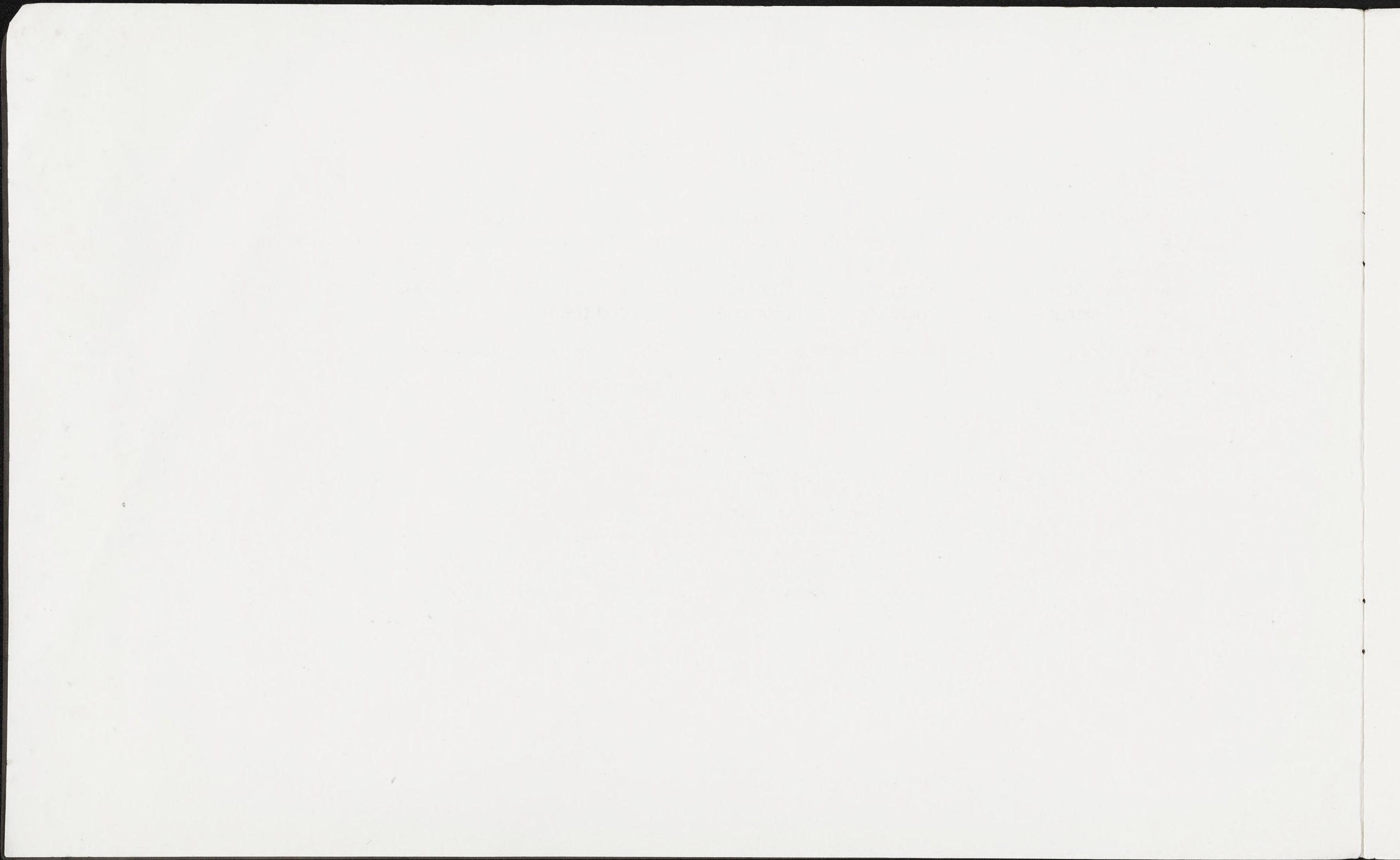
The work has now been started, and in July, 1925 the bridge will be opened for traffic.

What this achievement of modern American engineering skill entails may be realized from the fact that even the dauntless supermen who carried the first trans-continental railroads across the wildernesses to the Pacific balked at the task of bridging the Strait of Carquinez. So did the great Harriman, who in recent days reorganized and re-constructed the Central and Southern Pacific systems, but still left the passage of trains over the Strait to the ferryboat inaugurated by the pioneers.

Every trans-continental railway train to San Francisco, every automobile, every truck, every pedestrian that would pass from Sacramento to San Francisco, must cross the gap at the Carquinez Strait on a regular ferry or whatever other craft may carry him.

Modern economic necessities, the development of the prospering valleys, and the immense growth of California motor traffic within the past three years, could no longer tolerate the restrictions that this condition entailed. Hence the conception and materialization of the Carquinez Bridge project.

In the following pages are briefly set forth the general scope and main features of this project, the estimates of cost and earnings, and some salient facts that illustrate the urgent need for such an undertaking, and the unquestioned soundness of the project as considered from a financial point of view.



Strategic Site

THE Carquinez Bridge crosses the western or lower end of the Carquinez Strait, with terminals near Crockett, on the Contra Costa side, and near Vallejo, on the Solano side, respectively, a distance of about two-thirds of a mile. The Bridge is situated upon and will form part of the direct and shortest route from the San Francisco Bay region to all Central California and Northern points, and is being constructed exactly where modern motor traffic has blazed the trail.

When completed in 1925 the bridge will take over the traffic now served by the existing automobile ferries. It will also be able to take care of the increased traffic that will naturally follow upon the more stable facilities for travel that a bridge, as compared with a ferry, affords.

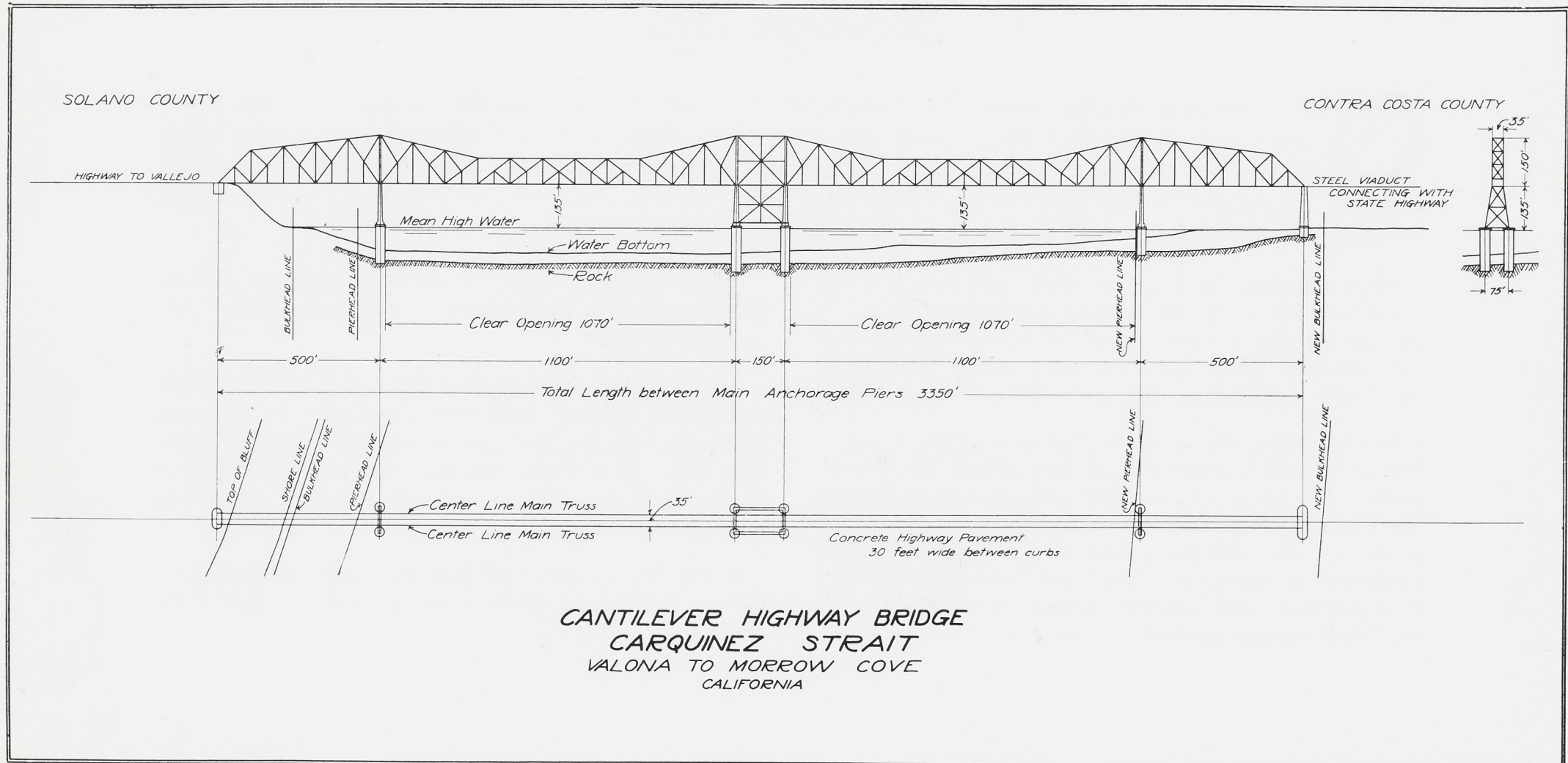
By this project the presently obstructed main thoroughfare of Central California is at last cleared for through traffic. The bridge will not only open the way as between San Francisco Bay, Sacramento and the trans-continental roads, but also will bring Central California into closer touch with and easier access to Eureka and the great areas of timber and other valuable territory now developing in the Northwestern sections of the State.

Incidentally the bridge will prove of high and obvious strategic value to the adjacent United States Navy Yard at Mare Island.

Briefly stated, the Carquinez Bridge will link the trans-continental highways that cross the Sierras into Central California with the chief port of the Pacific on San Francisco Bay. It will also link that port with the highways leading north into Oregon, and will be on the only direct route for such travel.

As creating an open road from the Sierras to the Golden Gate, it will be one of the more important bridges of the world.

Carquinez Strait Bridge--Elevation and Plan



Carquinez Strait Bridge

A Highway Bridge--General Design Features

AS SHOWN by the engineer's drawing on page four, the Carquinez Bridge contains two main spans each 1100 feet long, a central tower pier 150 feet wide and an anchor span 500 feet in length at each end. The total length of the main structure is 3350 feet.

In Solano County, on the north side of the strait, a concrete highway leads from the bridge-head north to the city of Vallejo. A steel viaduct connects the main bridge with the highway near Crockett, in Contra Costa County, on the south side of the strait.

The clearance height for ships is 135 feet above high water. This is two feet higher than the Brooklyn Bridge and the same height as the Manhattan and other great New York bridges.

The largest modern vessels will pass unobstructed under the bridge through either of the 1100-foot fairways.

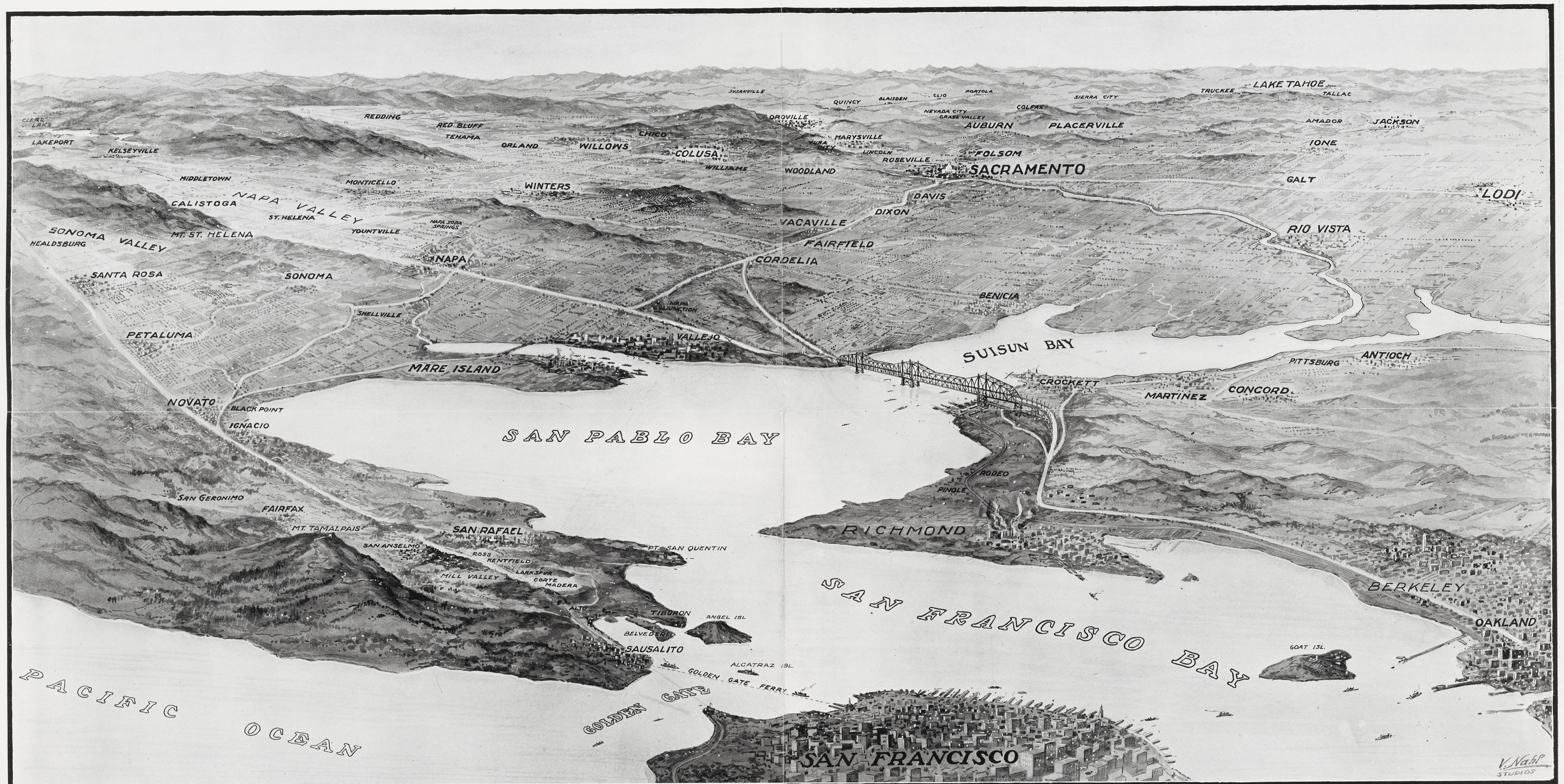
The truss height at the tower piers is 150 feet measured from the floor level. The main channel depths in Carquinez Strait, below high water, approach 100 feet to rock foundation. The height, therefore, from bed-rock to the highest points on the bridge trusses is about 400 feet. The bridge trusses are spaced 35 feet apart, giving ample roadway clearance for a concrete highway pavement 30 feet wide between curbs.

Carquinez Strait Bridge



General View of Carquinez Strait Bridge, when completed, drawn to scale from engineer's plans. Contra Costa shore, near Crockett, on right

Birdseye View of Carquinez Bridge showing adjacent Cities and Highways



As shown by the above Birdseye View of the country from the Sierras beyond Truckee to San Francisco Bay, the route via the Carquinez Bridge is the only direct route available.
Pending the completion of the bridge, all traffic, including automobiles, vehicles of every other kind, and pedestrians, have now to be ferried across the strait.

Carquinez Strait Bridge

(Continued)

The entire structure is built of steel and concrete and is thoroughly fire-proof. In accordance with War Department requirements each pier will be protected by suitable fenders for the safety of navigation and by necessary lights for signals and other aids to shipping.

The bridge in all its parts, trusses, foundations, approach viaducts, highway connections and so forth, is being built in the most substantial manner. The cantilever type has been selected rather than a suspension bridge because it is more economic, can be built with greater stiffness, and more readily adapts itself to future conditions to take care of an increase in traffic.

Estimated Quantities and Costs

Structural steel in the main cantilever bridge.....	11,731 tons
Concrete in the five main piers	27,300 cubic yards
Concrete in cantilever bridge floor	2,510 cubic yards
Reinforcing steel in main piers.....	1,776,000 pounds
Reinforcing steel in concrete floor.....	362,000 pounds
Estimated total structural cost of the bridge.....	\$4,000,000

Estimated Revenue

NO SATISFACTORY bases as yet exist from which to estimate the full revenues that should accrue from toll-bridge traffic over the Carquinez Strait. Minimum revenue estimates may however be gauged from past and current ferry receipts.

All precedent, as well as common-sense deduction, shows that a bridge as a substitute for a ferry service over any waterway invariably attracts more traffic than the ferry service. The difference in favor of the bridge traffic is normally so great that the figures in most instances seem inexplicable. When the Brooklyn Bridge was completed in 1883, it was apprehended that it would ruin the New York-Brooklyn ferry services. The reverse was the case, and there are now five great bridges over the East River.

During the period from the year 1918 to the year 1922, both inclusive, the gross revenues from the automobile traffic ferried over the Carquinez Strait, between the approximate points linked by the Carquinez Bridge, now building, increased from \$39,360 in 1918 to \$428,000 in 1922. The

normal increase of traffic on this ferry can be estimated at twenty per cent a year for the next two years. This will bring up the gross revenue to \$615,000 in 1924.

The earnings of this ferry system will be allotted to defray the dividend requirements of the bridge project while the bridge itself is in process of construction. For that purpose those earnings are more than ample.

The Bridge will be opened for traffic across the Strait by July, 1925, and the gross revenue for its first year of operation is estimated at \$800,000. Deducting from this amount the operating expenses, which for this purpose may be computed at the generous figure of \$75,000, a net sum of \$725,000 remains to take care of the dividend and surplus requirements.

The Pressing Opportunity

CALIFORNIA has a population of three and one-half millions. These three and one-half million people own more than nine hundred and thirty thousand registered motor vehicles—one to every $3\frac{3}{4}$ persons in the State.

The vehicles thus registered include:—

874,239 passenger automobiles,

39,413 motor trucks,

17,244 motorcycles.

Total 930,896

No other such large community on earth owns such a proportional number of motor vehicles. Yet the number of machines actually moving about the State is greatly in excess of the number licensed and registered.

California, with its attractions of climate, scenery, parks, matchless roads and boulevards, hunting and so forth, is *par excellence* the tourist State of the Union. By these tourists its automobile traffic is materially increased.

Also to be considered is the continuous influx of well-to-do settlers and prospective settlers from less favored

states. A large proportion of these visitors come in their own cars, and these help to swell the ever-increasing volume of traffic.

Other influences that tend in the same direction are the economic and other advantages of the State that have been seen by visitors and then advertised outside the State by reason of the facilities for and inducements to travel that prevail within its boundaries.

These attract outsiders to the development of California's resources, and thus create conditions of progressive development that cause further and continuous expansion of traffic.

This condition is illustrated by the figures that show the total number of motor vehicles registered within the State in January 1923 and January 1920, respectively, viz:

January, 1923—930,896

January, 1920—555,690

Increase in three years—375,206

In this connection it may also be pointed out that the sales of new motor vehicles in California last year totaled 169,197. Of these, 150,628 were passenger cars. Further

to illustrate motor traffic conditions in California it may be explained that at the close of 1922 New York State had only 781,070 automobiles, and Ohio, the next highest in rank, had only 740,000.

Exceptional circumstances in the line of restored national prosperity may have contributed to some of this remarkable increase—more than 67 per cent in three years. The development of California, however, has been steadily progressive during several years past, and continues to be steadily progressive, as the apparently inexhaustible resources of the State are opened up and exploited.

The traffic on its main arterial highways necessarily increased with the development of the territory adjacent to those main highways. This fact is demonstrated by the growth of traffic on the main highway from San Francisco and the Bay region to the Central Valleys and the trans-continental highways that converge upon Sacramento from the Sierras. That traffic has to cross the Carquinez Strait, and now crosses it by ferries at approximately the same point as that whereat the Carquinez Bridge is now being constructed.

The receipts of the automobile ferries across the Strait during the years 1918 and 1922, respectively, were:—1918, \$393,600—1922, \$428,000.

When the Carquinez Strait ferry system was comparatively new and incomplete, the automobilists either avoided the route altogether, or made a detour of forty miles each way up and down the river to the first bridge.

The Carquinez Strait blocks the only direct route between the San Francisco Bay region and the Central Valleys. To reach Vallejo, Sacramento, the Lincoln Highway, or the Victory Highway, the motorist must be ferried over the Strait or make a detour that may take him half a working day.

Even the trans-continental railroad express trains have to be carried across the gap on a ferryboat. It is the only way.

Such conditions are incompatible with the existing needs of traffic and are even less compatible with the obvious demands of future development.

A bridge that will permit of stable and continuous traffic is now an economic necessity. It must be regarded as an essential of traffic if the tourist and general travel brought

into the Central regions of California by the Lincoln and the Victory trans-continental Highways is to have adequate facilities of access to the metropolis at San Francisco and the Bay region generally. And it is to be assumed that access to those districts will be one of the chief objectives of automobilists using those great highways.

It is a fact proven by experience that a bridge will always attract more traffic than a ferry. Apart from the more stable facilities a bridge affords—the elimination of delays through accident to boats, congestion of traffic and the like—there is a widespread prejudice among automobile travelers that causes many of them to discriminate against ferries as in favor of bridges.

Even with such traffic as now seeks the ferries, however, the Carquinez Bridge, that is to be opened for traffic in 1925, should have been built before this.

With its popularity assured two years before its possible completion, and the need for its service increasing with every day of development in what is now the most progressive State of the Union, this structure promises to revolutionize modern traffic conditions in the heart of California almost as radically as the old traffic conditions were revolutionized by the completion of the trans-continental railroad in 1869. This comparison may seem exaggerated. Let it be borne in mind, however, that California had a population of only 560,000 persons in 1870. It has more than 930,000 motor vehicles to-day.

Conclusion

THIS bridge is being constructed by the Carquinez Bridge Company, composed mainly of California investors headed by Aven J. Hanford and Oscar H. Klatt, who now successfully operate the Golden Gate Ferry Company, between San Francisco and Sausalito, the Rodeo-Vallejo Ferry Company, between Selby and Vallejo, and other public utilities in the State of California. The plans, specifications and supervision of construction are under the direction of Charles Derleth, Jr., of Berkeley, as Chief Engineer, with William H. Burr of New York, the chief Consulting Engineer.

For further information address Carquinez Bridge Company, Golden Gate Ferry Building, Hyde Street, San Francisco, Charles Derleth, Jr., Berkeley, California, or William H. Burr, 120 Broadway, New York.

